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PCT
INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P045388PCTHBA/do	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA416)	
International application No. PCT/EP 03/08066	International filing date (day/month/year) 21.07.2003	Priority date (day/month/year) 30.07.2002
International Patent Classification (IPC) or both national classification and IPC B63B27/10		
Applicant SINGLE BUOY MOORINGS INC. et al.		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 6 sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the opinion</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>		
Date of submission of the demand 05.02.2004	Date of completion of this report 29.07.2004	
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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/EP 03/08066**

I. Basis of the report

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1, 3, 5, 6 as originally filed
2, 4 received on 28.06.2004 with letter of 28.06.2004

Claims, Numbers

1-12 received on 28.06.2004 with letter of 28.06.2004

Drawings, Sheets

2/4-4/4 as originally filed
1/4 received on 28.06.2004 with letter of 28.06.2004

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

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5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

see separate sheet

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	
	No: Claims	1-4,7-8,10-12
Inventive step (IS)	Yes: Claims	
	No: Claims	5-6,9
Industrial applicability (IA)	Yes: Claims	1-12
	No: Claims	

2. Citations and explanations

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP 03/08066

The following documents are referred to in this communication:

D1:US-A-5 097 786 (SHEFFIELD WOODROW W) 24 March 1992 (1992-03-24)
D2:US-A-4 683 832 (DYSARZ EDWARD D) 4 August 1987 (1987-08-04)
D3:US-A-6 082 947 (ADAMSON JAMES E) 4 July 2000 (2000-07-04)
D4:US-A-3 633 369 (LAWRENCE JOSEPH BENTON) 11 January 1972 (1972-01-11)

1. Unallowable amendments

The amendments in claim 1 filed with the letter dated 28/06/2004 introduce subject-matter which extends beyond the content of the application as filed, contrary to Article 34(2)(b) PCT. The amendments concerned are the following :

1.1 "the lifting unit is attached to the floating structure in a ***non-rigid manner***".

In the application as filed, such an attachment in a "***non-rigid manner***" was not explicitly disclosed. In the drawings and in claim 6 as filed it is disclosed that "the chamber is suspended from the floating structure via a guide cable". It is indeed true that there is an attachment in a "non-rigid manner" but this wording is a **generalisation** of what has been disclosed in the application as filed. Indeed an attachment in a "non-rigid manner" could be different than an attachment via a guide cable. Therefore is this amendment not allowable.

1.2 "comprising ***at least*** one equalisation opening".

In claim 1 as filed "an equalisation opening" was disclosed, in the description as filed (for example on page 4, line 25) "equalisation openings 23, 25" were disclosed and in the drawings two equalisation openings (23, 25) are described. Therefore in the application as filed one or two equalisation openings are disclosed. The wording "at least" implies that three or more equalisation openings could be present which was not disclosed in the application as filed. This amendment is therefore also an unallowable generalisation.

1.3 the feature "control means (41) ***connected to the gas supply means***" has been removed from the wording of claim 1. This is again an allowable generalization.

2. Novelty and inventive step

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2.1 Claims 1 and 11

The following statements applies to the present claims whereby the wording of claim 1 is the one where those amendments which contravene Article 34(2)(b) PCT have been removed.

The subject-matter of claims 1 and 11 is not new in the sense of Article 33(2) PCT.

Document D1 (see the relevant passages cited in the search report) is considered to be the closest prior art. It reveals:

2.1.1 a floating lowering and lifting device comprising a floating structure (1) and a lifting unit (110) lowerable from the floating structure (1) towards the sea bed (13), the lifting unit having a chamber (3) with a least one gas-inlet opening (21) in its wall and a gas supply means (40) connected to the gas inlet opening (21), the device comprising a control means (41) connected to the gas supply means (40) for controlling a gas supply rate to the chamber (3), the chamber comprising a releasable coupling member (19) for attaching to a load (100);

whereby the chamber comprises an equalisation opening (20 or 37) being in fluid communication with the environment outside the chamber (*in D1 there is a fluid communication with the environment outside the chamber - see drawing 8; column 5, lines 49-50; column 7, lines 17-22 - and the openings 20 may be used as equalisation openings*), the control means (41) **being adapted** to supply gas to the chamber for compensating gas volume loss at increasing depth of the lifting unit below sea level and to release air from the chamber after depositing a load onto the sea bed (*the device of D1 does not disclose this function but is adapted to perform it*).

As a consequence the subject matter of claim 1 is not new (Art. 33(2) PCT). Should the applicant amend claim 1 by including the features of claim 6 in such a new claim, the subject matter of such a new claim would not involve an inventive step (Art. 33(3) PCT) as being anticipated by D1 and D2 (see in D2 column 4, lines 17-21) or also by D1 and D3.

2.1.2 Document D1 reveals also:

a method of raising and lowering an object from the seabed comprising the steps of:

- attaching a load to a lifting unit (110) (as described above)
- adding or releasing a gas into or from a chamber (3) in dependence of the water depth

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while maintaining an open connection of the chamber with the sea via equalisation opening (20).

2.1.3 Document D2 is also novelty destroying for these claims.

2.2 Dependent claims 2-10 and 12

Dependent claims do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to novelty and inventive step, reasons for this can be found in the relevant passages of documents D1-D4 as cited in the search report.

3. Clarity

In figure 2, the reference sign 32 appears twice and denotes two different elements namely a tank and a electric signal control cable (see figure 2 and description pages 4-5). The requirements of Article 6 PCT and of **Rule 11.13(m) PCT** are therefore not met.

4. Other objections

4.1 Independent claim 1 is not properly cast in the **two-part form** in accordance with Rule 6.3(b) PCT.

4.2 Contrary to the requirements of **Rule 5.1(a)(ii) PCT**, the relevant background art disclosed in the document **D1** is not mentioned in the description, nor is this document identified therein.

4.3 The description is not in conformity with the new claims filed (**Rule 5.1(a)(iii) PCT**).

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gas supply rate to the chamber, wherein the chamber comprises a releasable coupling member for releasably attaching to a load.

The device according to the present invention can be used for lowering to the seabed of heavy loads (500 tons or more) in relative deep water (for example 1000m).
5 The lifting unit can be connected to and disconnected from the load and includes a large, "soft volume" structure which has an opening to the environment in the lower part and which can be filled with a gas above its opening to add buoyancy. Due to the fact that the chamber of the lifting unit is not a closed pressure module, the construction can be relative simple and can be constructed at low costs as there will be no pressure
10 differences between the inside and the outside of the module. The gas (air) inside the open chamber will compensate the weight of the chamber and the weight of the load to be transported to or from the seabed, at any position during the lowering and raising. Adding gas will ensure a controlled lowering /deployment of the combination of the device and the connected package, for example creating an uplift of 490-500 tons at a
15 load of 500 tons. During the way down, gas (such as for instance air or Nitrogen) needs to be added into the chamber as the gas trapped in it the will be reduced in volume due to the increase of the external water pressure. The combination of lifting device and load sinks due to the resultant small negative buoyancy of the combination, which can be controlled, from the floating barge by a vent system on the module. After depositing
20 the load on the seabed, gas is removed from the chamber via a gas release mechanism to maintain neutral buoyancy or a small positive buoyancy after disconnecting of the load such that the lifting unit can be retrieved at the water surface.

The control means connected to the gas supply means can comprise for instance an electrically or mechanically controlled valve in a gas supply duct to the chamber, or
25 a remote control valve on the chamber which is actuated by means of a sonar system or radio transmitter or any equivalent means such as fibre optics or any other signal carriers.

During operation, the gas inlet opening is during use situated higher along a longitudinal height of the lifting unit than the equalisation opening. Gas introduced into
30 the chamber will accumulate at the top whereas pressure equalisation with the surroundings takes place through the lower equalisation opening.

The gas supply means may, according to one embodiment, be placed on the floating structure, a fluid supply duct connecting the gas supply means to the chamber.

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will not be accelerated upwards by its reduced mass, but can be raised to the surface in a controlled manner.

Some embodiments of a floating lowering and lifting device according to the present invention, will, by way of example, be explained in detail with reference to the accompanying drawings. In the drawings:

Fig. 1 shows a schematic view of the first embodiment which the chamber of the lifting device is supplied with gas from floating structure;

Fig. 2 is an embodiment in which the chamber of the lifting device is provided with a compressed gas source connected to the chamber;

Fig. 3 is an embodiment which a closed volume filled with foam or gas is comprised in the device; and

Fig. 4 is an embodiment comprising a heave and roll compensating mechanism.

Fig 1 shows a floating lowering and lifting device 1 comprising a vessel or barge 2 and a lifting unit 3. Lifting unit 3 comprises a chamber 5 provided with a releasable coupling member 7 carrying a load 8 that is to be raised from or lowered to the seabed. The chamber 5 comprises gas inlet opening 9 which is connected to a gas supply hose 11. The air hose 11 may be wound on an air hose reel 12 and may be attached to gas supply means 13 which may formed of a compressor or which may be a storage tank comprising gas or compressed gas. A control valve 15 may be included in the air hose 11 for increasing or decreasing the gas supply rate from the tank of compressed air 13. The chamber 5 comprises furthermore a thruster 17 for positioning of the chamber and a controllable gas release valve 21, which may comprise a sonar detector 22 for communicating with sonar transmitter 24 for opening or closing of the valve 21. Sonar transmitter 24 may be operated from the vessel 2. Furthermore, the chamber 5 comprises equalisation openings 23, 25 in the lower wall 27 of the chamber 5 for equalising the pressure inside the chamber 5 with the ambient pressure. By controlling the valve 15, the gas supply rate to the chamber 5 is adjusted such as to lower the load 8 in a controlled manner at the same time the air hose is wound from the reel 12. For positional purposes and for retrieval of the chamber 5 onto the vessel, the chamber 5 is connected to a guide cable 29 that is connected to a crane 30 on the vessel.

Fig. 2 shows an embodiment in which tank 32 comprising compressed nitrogen is attached to the chamber 5. Compressed nitrogen can be entered into chamber 5 via a controllable valve 31 which is connected to electric signal control cable 32, operated

1. Floating lowering and lifting device (1) comprising a floating structure (2) and a lifting unit (3) lowerable from the floating structure (2) towards the sea bed, the lifting unit (3) having a chamber (5) with at least one gas-inlet opening (9) in its wall and a gas supply means (13,32) connected to the gas-inlet opening (9), the device (1) comprising a control means (14,15) for controlling a gas supply rate to the chamber (5), the chamber comprising a releasable coupling member (7) for attaching to a load, characterised in that the lifting unit (3) is attached to the floating structure (2) in a non-rigid manner, the chamber (5) comprising at least one equalisation opening (23,25) being in fluid communication with the environment outside of the chamber, the control means (14,15) being adapted to supply gas to the chamber for compensating gas volume loss at increasing depth of the lifting unit (3) below sea level and to release air from the chamber after depositing a load onto the sea bed.
2. Floating lowering and lifting device (1) according to claim 1, the gas inlet opening (9) during use being situated higher up along a longitudinal height of the lifting unit (3) than the equalisation opening (23, 25).
3. Floating lowering and lifting device (1) according to claim 1 or 2, wherein the gas supply means (13) are placed on the floating structure (2), a fluid supply duct (11) connecting the gas supply means (13) to the chamber (5).
4. Floating lowering and lifting device (1) according to claim 3, wherein the gas supply means (13) comprises a container with a compressed gas, the control means (15) comprising a valve connected to the fluid supply duct (11), or a compressor (16), the control means comprising a power control (14) operatively associated with the compressor (16).
5. Floating lowering and lifting device (11) according to claim 1 or 2, wherein the gas supply means comprise a container (32) connected to the chamber (5) via a controllable valve (31), the container comprising a compressed gas and being lowerable

with the chamber, the control means (33) being connected to the valve (31) for controlling the gas supply to the chamber (5).

6. Floating lowering and lifting device (1) according to any of the preceding claims,
5 wherein the chamber (5) is suspended from the floating structure (2) via a guide cable (29).
7. Floating lowering and lifting device (1) according to any of the preceding claims,
the chamber (5) comprising at least one thruster (17) powered via a control line.
- 10 8. Floating lowering and lifting device (1) according to any of the preceding claims,
wherein the chamber (5) comprises a closed compartment (34).
9. Floating lowering and lifting device (1) according to any of the preceding claims,
15 wherein the guide cable (29) or control line is connected to a sheave at one end of an arm (43), which is suspended from the floating structure (2), a counterweight (44) attached to an other end of said arm (43).
10. Floating lowering and lifting device (11) according to any of the preceding
20 claims, having a gas release mechanism (21) connected to a control means which is adapted to open the gas release mechanism after placing the load on the sea bed, prior to detaching the releasable coupling member (7).
11. Method of raising and lowering an object (8) from the seabed comprising the
25 steps of:
 - attaching a load (8) to the lifting unit (3) according to any of the preceding claims;
 - adding or releasing a gas into or from the chamber (5) in dependence of the water
depth while maintaining an open connection of the chamber with the sea via the
30 equalisation opening (23, 25).

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12. Method according to claim 11, wherein upon depositing the load (8) onto the seabed gas is released from the chamber (5) to maintain a substantially predetermined buoyancy when the weight of the load is transferred from the lifting unit to the seabed.

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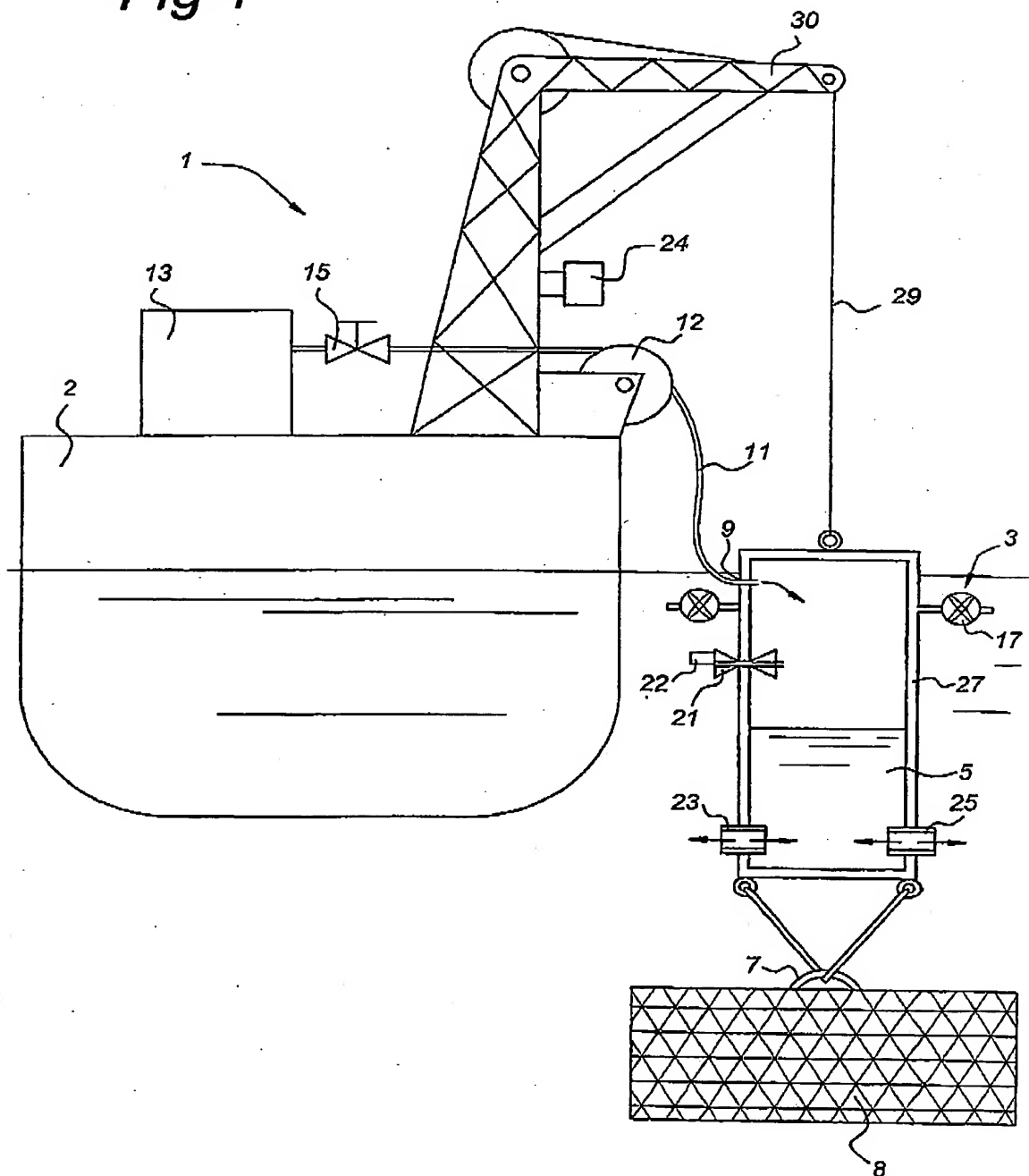
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Fig 1



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